

RESEARCH SUPPORTING SOUND DECISIONS



**2010
2011**

**PROGRESS
REPORT**

A Marketplace of Ideas

The Joint Fire Science Program (JFSP) vision comes from listening. The program devotes an extraordinary amount of effort to listening and being responsive to the needs of the agencies we serve and the fire managers who implement our discoveries. Through the prism of experience and wisdom of national and regional leaders, the National Wildfire Coordinating Group, university and federal scientists, and fire managers throughout the nation, the JFSP anticipates the future needs of our clients and delivers research that supports sound decisions. First and foremost, the JFSP is an interagency marketplace for wildland fire science ideas.

Our annual solicitation for research proposals distills all of these ideas into a set of focused questions aligned with the JFSP investment strategy (see page 3). Once the solicitation is complete in November, rigorous peer review and competition are the next filters employed

to ensure only the highest quality projects receive funding. Our peer review process has two stages: an independent blind review of all proposals from experts and a Governing Board review of proposals forwarded for consideration. Table 1 shows that our funding is highly competitive. Much like commercial markets, we believe that competition in the scientific marketplace results in efficient pricing, another trend shown in Table 1.

In 2010, 12 task statements were solicited resulting in 134 proposals requesting almost \$37 million. After peer review, 33 proposals were selected, and \$8.7 million was awarded. In-kind contributions garnered another \$5.5 million, or 63 percent, in additional financial support from other research institutions or agencies. Fiscal year 2011 garnered similar results. The JFSP estimates that an annual investment of \$20 million is needed to meet current and projected management needs.

Table 1. Summary of project proposal funding from fiscal year 2005 to 2011

Fiscal Year	Proposals Submitted	Requested Funding	Average Proposal Cost	Percentage of Proposals Funded
2011	132	\$ 27,543,898	\$ 275,439*	27%
2010	134	\$ 36,697,537	\$ 273,862	24%
2009	179	\$ 40,800,441	\$ 227,935	20%
2008	98	\$ 24,752,310	\$ 252,575	34%
2007	163	\$ 46,233,013	\$ 283,638	23%
2006	203	\$ 62,620,607	\$ 308,476	24%
2005	216	\$74,674,599	\$ 345,716	28%

* Please note that although 132 proposals were submitted in 2011 for \$27.5 million, the average proposal cost does not count 32 Graduate Research Innovation proposals because they were limited to \$25,000 for each proposal.

Our Investment Strategy

In recognition of the JFSP’s 10-year anniversary in 2008, the JFSP Governing Board conducted an independent program review. The final review contains 28 recommendations and was delivered in January 2009. In response to these recommendations, the board developed an overarching 5-year investment strategy to guide future program actions. The strategy articulates how the program intends to balance investments in short-term and long-term science, applied and fundamental science, science delivery and adoption, and program administration and evaluation.

In comparison with investments prior to 2009, the new strategy reflects an increased emphasis on science delivery and adoption, program administration and evaluation, and

long-term science, all in response to specific recommendations from the program review.

Lines of work

Forty percent of our funding is dedicated to lines of work. Lines of work are developed to address complex management problems that require coordinated, multiyear investments to develop useful, integrated solutions. Mixes of fundamental and applied studies are employed as appropriate. The investment strategy for a line of work is developed through problem framing with managers and subsequent science planning. The JFSP is currently engaged in three lines of work which we explore in the following pages.



Table 2. Investment topics with their correlating investment goal percentages

Investment Topics	Investment Goal
Science	65%
Lines of work	40%
Emerging management needs	15%
New science initiatives	5%
Long-term trends—remeasurement	5%
Science delivery and adoption	25%
Program administration and evaluation	10%

Lines of Work: The Interagency Fuels Treatment Decision Support System, A Pathway to Systems Integration

The Current Environment

After extensive client interaction and practitioner sensing, the JFSP determined that a *lack of integration* of data, software models, and systems is a huge, costly, and continuing problem. Existing fire and fuel models are generally stand-alone, difficult to “string” together, problem-specific, lacking support, and not accessible to all stakeholders. Therefore, information technology governance is challenged because development standards do not exist, resulting in redundant and fragmented efforts.

JFSP Is Building an Integrated Framework

The JFSP is funding the development of a web-based model and data integration framework for fuels treatment planning as an example and potential stepping stone towards a larger interconnected system-of-systems (S-O-S) framework for wildland fire. This data and software integration framework is called the **Interagency Fuels Treatment Decision**

Support System (IFT-DSS), and is currently in development and testing.

While our current efforts are focused specifically on fire and fuels management, the methods, guidelines, and processes we discover in the development of the IFT-DSS will be applicable to a whole host of natural resource decision support information needs. The bottom line is, there will be major savings in time and effort to complete comprehensive fuel treatment analysis across all landscapes.

Six Critical Business Needs

An IFT-DSS design team, consisting of fuels treatment specialists and planners, identified six business needs that drove the design of IFT-DSS.

- ❶ Data acquisition and preparation
- ❷ Assessment of current fuel conditions
- ❸ Prescribed burn planning
- ❹ Placement of treatments
- ❺ Analysis of treatment effects
- ❻ Risk assessment among several alternatives

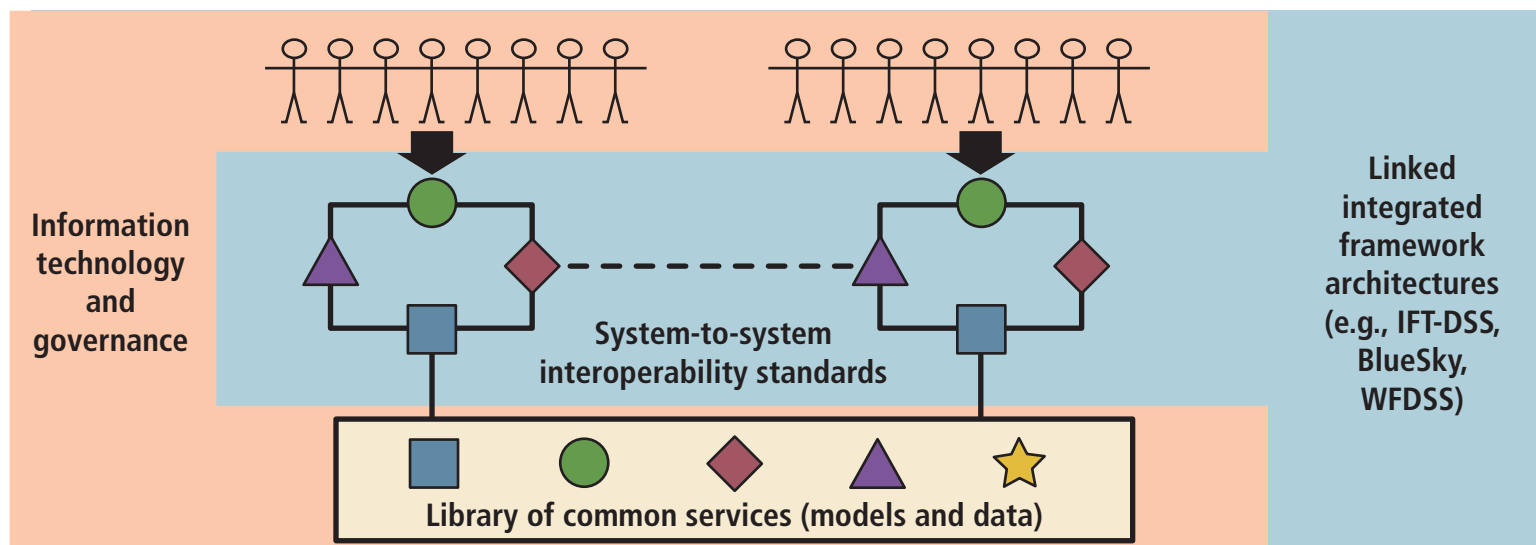


Figure 1. System-of-systems framework for wildland fire

Lines of Work: Smoke Management and Air Quality

In 2007, the JFSP conducted a wildland fire smoke needs assessment, hosting two parallel roundtables (in the Eastern and Western U.S.) in which managers and scientists developed lists of priorities. It was clear from the roundtables that a comprehensive and extensive science plan was needed to focus future investments.

The science plan was completed in 2010 based on a series of meetings, interviews, and web-based questionnaires. More than 900 people responded to the questionnaires, which, we believe, is the largest and most diversified set of responses to smoke research needs ever collected in the U.S.

The resulting plan has four research themes as its foundation:

- Smoke Emissions Inventory Research
- Fire and Smoke Model Validation
- Smoke and Human Populations
- Climate Change and Smoke

Each theme has a clearly defined objective to be achieved within a 5-year program of research. Each theme outlines yearly activities to incrementally move the program of research forward to achieve the thematic goals. These yearly activities are designed to complement research across themes so that synergisms are fostered and perhaps even open the door to unexpected possibilities. In this way, the JFSP “Smoke Science Plan” differs with past smoke research assessments as it creates a program of incremental work to progress toward specific objectives rather than defining science needs in general terms. This plan can be examined in its entirety at: www.firescience.gov/JFSP_Smoke_Air.cfm

Research funded from the smoke line of work is shown in Table 3.

Table 3. Solicitation of work from fiscal year 2008 to 2012

Fiscal Year	Proposal Solicitation
2008	Smoke and emissions models evaluation
2009	1) Regional haze—ozone and secondary organic aerosol formation 2) Smoke dispersion from low-intensity fires
2010	Public perceptions of smoke management
2011	1) Fire smoke and ozone standards analysis 2) Mega-fire smoke and population impacts trajectory analysis
2012	1) Assessment of fire emissions inventory tools 2) Assessment of prescribed fire contributions to PM2.5 and PM10 standards



Lines of Work: Fuels Treatment Effectiveness and Effects

In 2009, the Government Accountability Office (GAO) recognized our past and continuing work in fuel treatment effects and effectiveness in GAO Report GAO-09-877 Wildland Fire Management (p. 11):

“The Joint Fire Science Program, for example, has funded almost 50 studies examining the effectiveness of fuel reduction treatments in different locations and has begun a comprehensive effort to evaluate the effectiveness of different types of fuel treatments, as well as the longevity of those treatments and their effects on ecosystems and natural resources. Efforts like these are likely to be long term, involving considerable research investment, and have the potential to improve the agencies’ ability to assess and compare the cost-effectiveness of potential treatments in deciding how to optimally allocate scarce funds.”

The effectiveness and effects of fuels treatments are central to the JFSP mission and have been since the creation of the JFSP in 1998. Significant investments have been made

in more than 170 research projects related to this line of work. Many of these studies are complete (127) and have been recently summarized in a number of formats.

The JFSP has summarized this information for fire and fuels managers in the form of fuels treatment guides, for scientists in the form of scientific manuscripts, and for JFSP program planning in the form of a science plan. The fuels treatment guides for managers have been developed for major ecosystems and regions. Also, a scientific summary (meta-analysis) of JFSP-funded work in this area has been recently conducted and reviewed. The scientific review, as well as manager roundtables on this topic, formed the basis for a JFSP fuels treatment science plan. The manager fuels treatment guides, scientific summary, and science plan are available at www.firescience.gov.

The science plan highlights that, while much has been learned, significant new work is needed to support fire managers (see Table 4).

Table 4. Focal areas for future work

Science Focus	Topics of Interest
Fuels treatment effectiveness	Longevity of treatments Cost efficiency—strategic placement of treatments Metrics, guidelines, or standards Less-studied ecosystems
Fire effects	Improved predictive models—direct and indirect effects Relationship with threatened and endangered species
Fire behavior	Improved predictive models Spatial- and physics-based systems

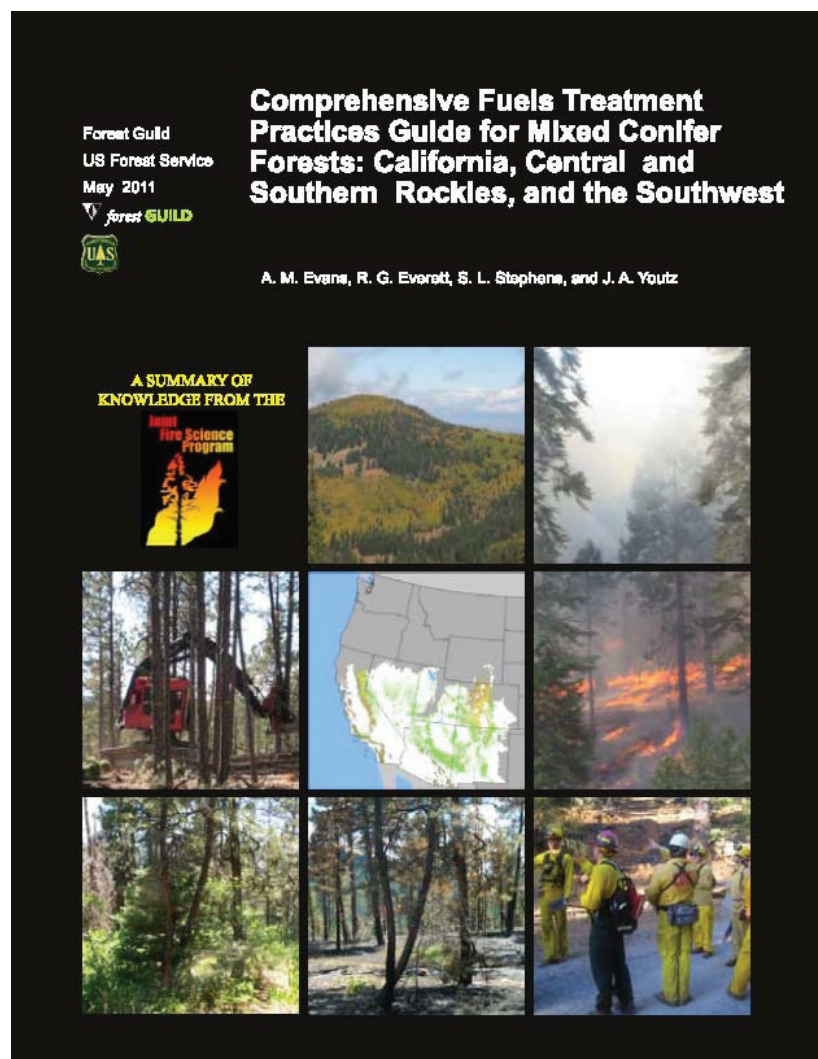
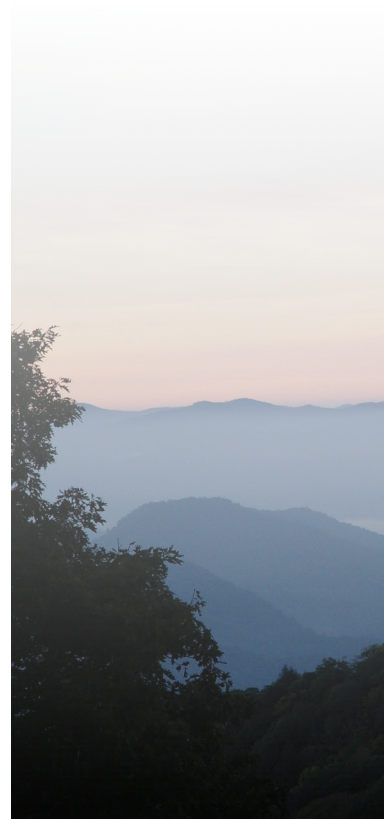


A key result from the fuels treatment science plan is that improved tools for prediction of fire behavior and fire effects are needed to support analysis of treatment effectiveness. Current tools use empirical relationships that were developed in the 1970s and 1980s. Promising new tools, based on the physics of combustion and atmospheric dynamics, offer the potential for more realistic and robust prediction tools. However, these new tools need sustained investments for full development and application.

An approach the JFSP is currently funding is the integrated collection of fuels, weather, fire behavior, and smoke data on experimental and

operational burns to develop the necessary field data to support improved fire behavior, fire effects, and smoke prediction tools. These burns are intensely instrumented with state-of-the-science sensors.

Our fuel treatment line of work is positioned to complement future science needs identified in "A National Cohesive Wildland Fire Management Strategy," which was developed by the Departments of Agriculture and Interior. We believe our work has and will continue to yield information for a coordinated response to fuel management issues across all ownerships nationwide.



Return on Investment



As the name implies, JFSP is *jointly* funded by the Departments of Agriculture and Interior as a true interdepartmental collaborative research organization. Governance is through a 10-member Governing Board with 5 members from the U.S. Forest Service and 1 member each from the Bureau of Land Management, Bureau of Indian Affairs, U.S. Fish and Wildlife Service, National Park Service, and U.S. Geological Survey. Our charter was derived from congressional language in 1998 with concurrence from our sponsoring departments and agencies, “To provide a scientific basis and rationale for implementing fuels management activities, with a focus on activities that will lead to development and application of tools for managers.”

In accomplishment of this mission, we believe:

- Managers and scientists together must help shape, define, and steer our research agenda.
- The program has a unique perspective and strength as an interagency research and development partnership.
- Open competition and rigorous peer review lead to quality.
- Our investment strategy is transparent and directs all research investments.
- Our research must be centered on solving problems to be effective.

- Our science planning processes result in focused investments for lines of work.
- Our Knowledge Exchange Consortia will accelerate the adoption and implementation of science findings and provide training and learning for fire professionals throughout the nation.

For 13 years, this partnership has developed information that managers use every day to predict fire effects and plan fuel treatments. We play a leadership role in focusing wildland fire research. JFSP financial support has resulted in improved fire behavior predictive tools. Safety knowledge for firefighters has been improved through greater understanding of safety zones. Our lines of work will produce integrated solutions and much-improved predictors for smoke management. Our Interagency Fuels Treatment Decision Support System will become the web platform for fuels planning nationwide across all landscapes with the potential for significant reductions in model development, systems operation, and maintenance costs, while providing more effective integration and collaboration within agencies and the public. And when the results are in, our JFSP Knowledge Exchange Consortia demonstrate and teach the new findings so they can be adopted and implemented on the ground.

Table 5. Summary of project funds from fiscal year 1998 to 2011

	Total	2011	2010	2009	2008	2007	2006	2001-2005	1998-2000
Appropriations (in millions)	\$186	\$14	\$14	\$14	\$14	\$12	\$14	\$80 total (\$16 annually)	\$24 total (\$8 annually)
Projects Funded	604	48	55	54	33	37	49	279	49
Projects Completed	452	3	6	21	22	28	44	279	49
Projects in Progress	152	45	49	33	11	9	5	0	0

Big Picture

While any categorization of projects is over simplified, Table 6 shows where our investments have been made. Not surprisingly, fire effects and ecology, fuel treatments, and air

quality topics have received the most attention (37 percent) because these are the issues that most directly affect managers.

Table 6. Total research projects by category from fiscal year 1998 to 2011

Category	Total	Completed	Active
Fire effects and ecology	104	78	26
Fuel treatments	72	48	24
Air quality, smoke management, and weather	46	31	15
Workshops and conferences	43	41	2
Planning and risk	34	31	3
Science and technology applications	33	27	6
Social and economic science	32	16	16
Other projects	32	11	21
Stabilization, rehabilitation, and restoration	31	25	6
Fire regimes and history	31	27	4
Decision support	29	26	3
Fire behavior	23	12	11
Inventory and mapping	23	19	4
Invasive species	21	18	3
Wildlife	18	11	7
Remote sensing	18	18	0
Demonstration sites	11	11	0
Methods	2	1	1
Cultural resources	1	1	0
Totals	604	452	152



Tables 7 and 8 summarize the interest in and funding for the JFSP's solicited research topics and contracted projects.

Table 7. 2010 research proposal summary

Task	Research Topic	Total Funded	Proposals Received	Proposals Funded
10-1-01	Mastication fuel treatments – effectiveness and effects	\$ 1,414,019	18	4
10-1-02	Canopy fuels estimation	\$897,732	7	3
10-1-03	Public perceptions of smoke management	\$583,659	7	2
10-1-04	Fuels mapping in nonforested ecosystems	\$812,831	15	2
10-1-05	Organizational learning – prescribed fire escapes	\$176,800	1	1
10-1-06	Compatibility of fuel treatments and fire management with conservation of threatened and endangered wildlife species	\$885,021	24	3
10-1-07	Fire weather forecast accuracy	\$920,818	11	3
10-1-08	Fuel moisture influences on combustion	\$406,721	5	2
10-1-09	Ethnoecological fire traditions – understanding and demonstration	\$245,390	3	1
10-1-10	Remeasurement opportunities – carbon budgets and insect outbreaks	\$1,077,285	16	4
10-2-01	Synthesis: fire and eastern oaks	\$309,616	5	2
10-3-01	New Science Initiative: social science and wildfire	\$806,283	22	6
Subtotal for 2010 Solicited Proposals		\$ 8,446,175	134	33
10-C-01	JFSP contracts (Smoke Science Plan, IFT-DSS, science writers)	\$ 2,034,972	5	5
10-S-01	Conferences, workshops, and symposia support	\$ 33,745	3	3
10-S-02	Board requested proposals	\$570,484	5	5
09-S-03	Synthesis (project funded in 2010)	\$348,500	1	1
09-S-04	Knowledge Exchange Consortia (projects funded in 2010)	\$2,974,792	8	8
Subtotal for 2010 Contracts (C) and Special Projects (S)		\$5,962,493	22	22
Grand Total		\$ 14,408,668	147	55

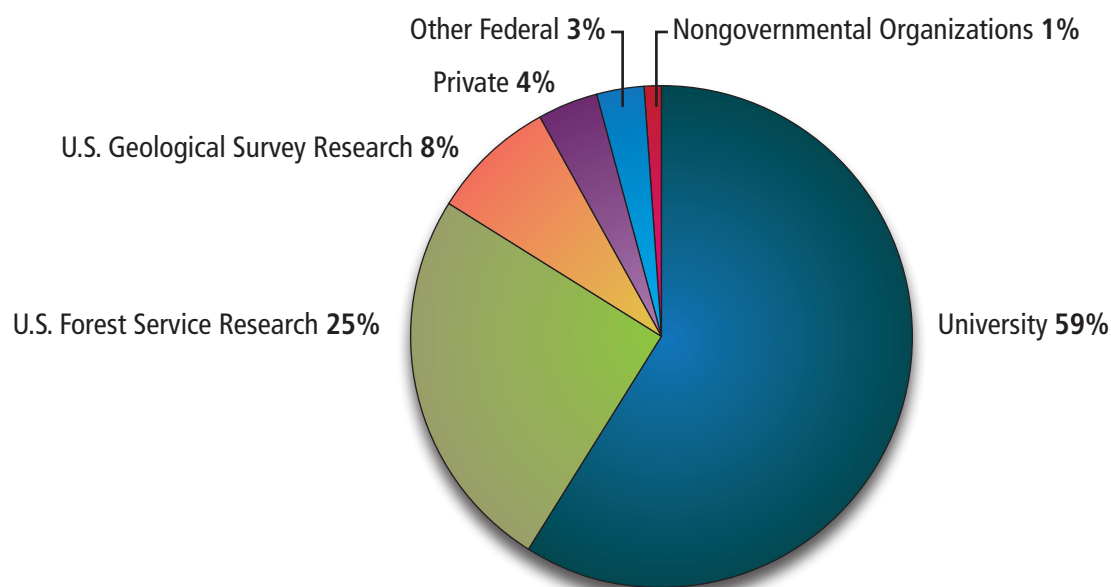


Figure 2. 2010 funded proposals by principal investigator organization

Table 8. 2011 research proposal summary

Task	Research Topic	Total Funded	Proposals Received	Proposals Funded
11-1-1	Remeasurement – High-severity fire, salvage	\$ 1,160,578	16	5
11-1-2	Shrub and grass fuelbed production, growth, and succession	\$1,365,802	23	4
11-1-3	Evaluating the effectiveness of mitigation activities in the wildland-urban interface	\$962,520	10	2
11-1-4	Fuel moisture influences on combustion	\$888,750	7	2
11-1-5	Black carbon effects on atmospheric warming	\$713,187	9	3
11-1-6	Fire smoke and ozone standards analysis	\$370,000	5	1
11-1-7	Mega-fire smoke and population impacts trajectory analysis	\$645,016	2	2
11-1-8	Effectiveness and effects of pile burning	\$605,925	7	2
11-1-9	Fuel treatments and the wildland-urban interface	\$551,243	8	2
11-2-1 *	Integrated measurements of fuels, fire behavior, and smoke	In review	7	In review
11-3-1 **	Graduate Research Innovation Award	\$154,128	32	7
11-4-1	Regional science exchange consortia planning	\$535,136	6	6
Subtotal for 2011 Proposals		\$ 7,952,290	132	36
11-C-01	Smoke line of work contract	\$ 488,032	1	1
11-S-1	Conferences, symposia, and workshops	\$60,000	4	4
11-S-2	Board requested proposals	\$101,562	5	5
Subtotal for 2011 Contracts (C) and Special Projects (S)		\$ 649,592	10	10
Grand Total		\$ 8,601,882	142	46

* Integrated measurements of fuels, fire behavior, and smoke are pending approval and will be funded in 2012.

** Graduate Research Innovation Award proposals were capped at \$25,000 per proposal.

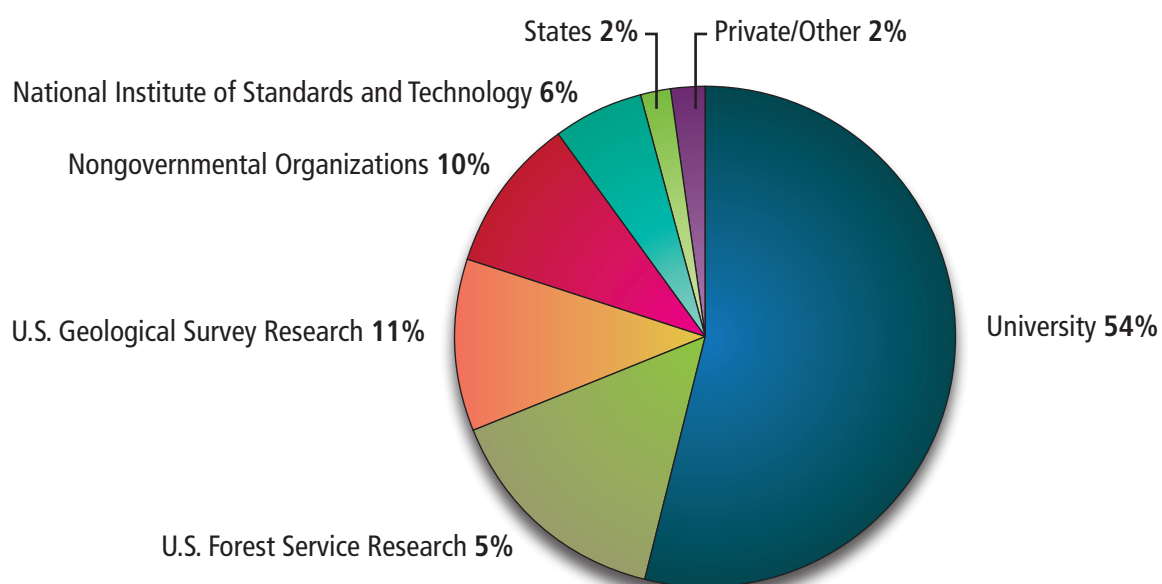


Figure 3. 2011 funded proposals by principal investigator organization

Research that Makes a Difference

Our Partners: 28 Institutions Funded in 2011

Auburn University, Brigham Young University, Colorado State University, Florida Atlantic University, Michigan Technological University, Northern Arizona University, Oklahoma State University, Oregon State University, Penn State, University of Alabama-Huntsville, University of California–Berkeley, University of Idaho, University of Montana, University of Tennessee, University of Washington, University of Wisconsin–Madison, Utah State University, Washington State University, U.S. Forest Service Pacific Northwest Research Station, U.S. Forest Service Pacific Southwest Research Station, U.S. Forest Service Rocky Mountain Research Station, U.S. Forest Service Southern Research Station, U.S. Forest Service Western Wildland

Environmental Threat Assessment Center, U.S. Geological Survey, National Institute of Standards and Technology, Texas Forest Service, CAL FIRE, and Western Governors' Association.

Greater Yellowstone Ecosystem – Bark Beetles and Crown Fires

In the last 10 years, outbreaks of native bark beetles have affected more than 47 million hectares of forests in western North America. The abundance of dead trees across the landscape has raised concern among land managers and the public about whether or not bark beetle outbreaks increase the likelihood of crown fires. A JFSP-funded study by Simard et al. 2011 brings new information on this issue.



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Figure 4. 2010/2011 funded research proposals based on location

Management Implications

#1. Even though red and dead trees killed by mountain pine beetle are abundant and conspicuous throughout Greater Yellowstone, our results suggest that the forests are not more likely to burn than undisturbed forests of the same age.

There is no question that mountain pine beetles change forests and affect human values and that tree mortality is extensive. Further, beetle-killed forests certainly can burn. However, Simard et al. 2011 results suggest that the beetle-induced changes do not increase the likelihood of active crown fire relative to comparable undisturbed forest, as the beetles are thinning the forest canopy fuels.

#2. The presence or absence of mountain pine beetle attack may not be a useful criterion to determine where and when fuel treatments should be carried out.

Fuel treatments may be important to protect buildings or other infrastructure from fire. However, Simard et al. 2011 findings indicate that green lodgepole pine forests can burn as readily as beetle-killed forests; therefore, fuel reduction may be equally important in green, red, and gray stands—wherever vulnerable resources are at risk of fire damage.

#3. Harvesting may not be required in beetle-killed forests to reduce fire hazard and the likelihood of active crown fire.

Beetle-killed forests might still be harvested for their timber, and hazard trees might need to be removed from populated areas to reduce the danger of falling trees. However, the rationale of mitigating a perceived increased likelihood of active crown fire in beetle-killed lodgepole

pine using salvage harvesting would not be supported by this study.

Reference

Simard, M., W.H. Romme, J.M. Griffin, and M.G. Turner. 2011. Do mountain pine beetle outbreaks change the probability of active crown fire in lodgepole pine forests? *Ecological Monographs* 81 (1): 3-24. www.esajournals.org/doi/full/10.1890/10-1176.1.

Learning from Escaped Prescribed Fire Reviews

While this project regarding escaped prescribed fires is yet to be completed, it is already transferring valuable knowledge to the National Wildfire Coordinating Group's current effort to review and update the "Interagency Prescribed Fire Planning and Implementation Procedures Guide." Prescribed fire escapes continue to occur with regularity in all federal and state fire management agencies in the United States. By interagency policy, after an escape, official reviews must be prepared. The fundamental question is, do any of the escaped prescribed fire review processes actually promote organizational learning?

In 2011, researchers held five regional dialogue sessions with members of the interagency prescribed fire community in Portland, Oregon; Denver, Colorado; Salt Lake City, Utah; Tucson, Arizona; and Tallahassee, Florida. Session results are generating a better picture of the general climate for learning and the activities and processes that facilitate or impair individual and organizational learning. The following are findings and practices that will further improve learning.





Individual learning varies by position and hierarchical level. For instance,

- Burn team members (those involved in the burn operation) gain insight during an event or during the informal unit-level after action reviews, but rarely from formal review processes.
- First-line managers find the reports generated by a formal review more useful, particularly for developing materials for burn boss refresher courses.
- Review team members gain insight into their own practices while reviewing those of others.
- Managers in regional and national positions use reviews to demonstrate due diligence, help explain events to outside audiences, and identify trends and patterns across units.
- People desire to review and learn from all types of events, not only those that exceed burn plan parameters or result in an injury.
- The transfer of lessons occurs most vividly through personal contacts, particularly if the presentation, staff ride, or sand table exercise puts the participant in the shoes of operational personnel.

The following preliminary results also reveal barriers that currently inhibit learning.

- Too often, review processes generate defensiveness rather than participant learning. Consequently, key information for improving future performance is driven underground. Greater clarity, transparency, and communication of a review's purpose—by policy, guidance, and leader's intent—are considered critical to address this.

- The current "one process and one report" structure may meet the needs of higher management by capturing a story for legal accountability purposes, but it inhibits ground-level learning and operational resiliency. The cultures of "blame" and "learning" oppose each other; distinguishing and separating intent, actions, and outcomes that seek legal accountability versus learning may be an important next step.
- There's confusion about who is the target audience—the review process and the resulting products present a barrier to transfer local learning to others. Clarity in audience, purpose, and product design can mitigate this.

Finally, preliminary results identified the following three major gaps.

- There is lack of a swift and comprehensive distribution system for review results to the field.
- There is lack of a process to turn written reports into more useful learning products for the field.
- There is lack of a system to periodically scan for, analyze, and report trends.

Rethinking and re-crafting the postevent reflection process to ensure that local and peer learning occurs should enhance organizational learning and result in a more robust system that accomplishes strategic, operational, and realtime learning.

Project deliverables will include a series of six short video podcasts identifying tips and techniques to improve learning drawn from the workshops, a formal analysis and synthesis of workshop discussions, a series of field-oriented fact sheets, and presentations to management-oriented groups.

Tipping Points: Fire May Change Yellowstone by Mid-21st Century

In 2009, the JFSP New Science Initiative began with a goal of pushing the frontiers of knowledge and generating new ideas and concepts in fire ecology. The JFSP was interested in sponsoring projects and supporting activities that lead to or advance innovative ideas regarding the interactions of fire, vegetation, and fuels in a changing climate. The program funded five proposals after extensive peer review. The first of these projects has just been completed: "Climate, Fire and Carbon: Tipping Points and Landscape Vulnerability in the Greater Yellowstone Ecosystem" (Project 09-3-01-47). The following results are from the author's conclusions published in the "Proceedings of the National Academy of Sciences."

- Continued warming could completely transform the Greater Yellowstone Ecosystem fire regimes by the mid-21st century, with profound consequences for many species and ecosystem services, including aesthetics, hydrology, and carbon storage.
- The conditions associated with extreme fire seasons are expected to become much more frequent, with fire occurrence and area burned exceeding that observed in the historical record or reconstructed from paleoproxy records from the past 10,000 years.
- Even in years without extreme fire events, average annual area burned is projected to increase, and years with no large fires—common until recently—are projected to become increasingly rare.
- The magnitude of predicted increases in fire occurrence and area burned suggests that there is a real possibility of

Yellowstone's forests being converted to nonforest vegetation during the mid-21st century because reduced fire intervals may preclude postfire tree regeneration.

- The climate-fire system is a tipping element that may qualitatively change the flora, fauna, and ecosystem processes in this landscape and could be indicative of similar changes in other subalpine or boreal forests.

Reference

Westerling, A.L., M.G. Turner, A.H. Smithwick, W.H. Romme, and M.G. Ryan. 2011. Continued warming could transform Greater Yellowstone fire regimes by mid-21st century. *Proceedings of the National Academy of Sciences* 108: 32. www.pnas.org/cgi/doi/10.1073/pnas.1110199108.



Educating and Training the Next Generation of Scientists and Managers

The JFSP does not provide salary for permanently employed investigators. Most of the funding supports students, field crews, and the costs of gathering data in the field. This results in educating and training graduate students, which leads to master's and doctoral degrees in fire science and related disciplines. In 2011, 54 percent of our funding was awarded to university investigators. In 2010, 59 percent of available funding went to universities.

Impact

A recent survey of 82 principal investigators (18 percent sample size) found that 589 students have been supported by JFSP funding and that 116 of them received master's or doctoral degrees. Many of these students (33 percent of those with master's degrees and 22 percent of those with doctoral degrees) subsequently went on to work for state or federal agencies. Many others are in university programs conducting research and helping educate future fire professionals. Our funding directly trains the next generation of professionals and scientists.

The University of Idaho's College of Natural Resources created the nation's first Bachelor of Science in fire ecology and management focused on wildland fire. In addition, online college credits in wildland fire science are now available for midcareer employees who cannot go back to school. The JFSP funded the development of eight web-based, upper division fire science and management courses in project 05-4-1-07. Additional online courses have been developed at Humboldt State University, Mississippi State University, North Carolina State University, Northern Arizona University, Oregon State University, Penn State,

University of Montana, University of Tennessee, and Virginia Tech to name a few.

Graduate Research Innovation (GRIN) Awards

In partnership with the Association for Fire Ecology, the JFSP invited current master's and doctoral students in 2011 to apply for Graduate Research Innovation (GRIN) Awards. These \$25,000 awards allow graduate students to conduct research that will supplement and enhance the quality, scope, or applicability of their thesis or dissertation and to build skills needed for independent inquiry. In all, seven students were selected, representing five universities: Penn State (1), University of Arizona (1), University of Florida (2), University of Hawaii – Manoa (1), and University of Idaho (2).

Travel, Research, and Educational Experience (TREE) Grant Program

TREE grants provide funding that enables graduate and undergraduate students to travel to fire conferences, symposia, workshops, and laboratories. The objective of the program is to nurture student research through active participation in conferences and laboratories and to encourage student researchers to interact and network with other researchers and managers. TREE grants are an investment in the next generation of professional researchers, managers, and educators. A total of 18 students received TREE grants, representing 13 different universities from 9 states.

Through all of these efforts, the JFSP is helping develop the next generation of wildland fire leaders.



Beyond Science Delivery: The JFSP Knowledge Exchange Consortia

Fire managers often say, “We get a firehose of information, and it’s often delivered with the fog nozzle on.” Our goal is to accelerate the awareness, understanding, adoption, and implementation of wildland fire science information. To achieve this goal, the JFSP is creating a nationwide network of Knowledge Exchange Consortia. Eight consortia are in operation, and six more have just been initiated.

The consortia act as filters to weed out information that is not relevant to a specific ecoregion. Then they find the best local science information and put it in context for their area. It is one thing to make managers aware

of information, but the consortia do more by actually demonstrating the science findings in the field. “Show me” is a big part of this outreach effort, along with personal interaction in the field.

The JFSP is trying to foster a dialogue where scientists and managers help frame problems together at the beginning of research. Applied research needs manager “buy-in” at the beginning of the research process.

Jeanne Higgins, forest supervisor of the Humboldt-Toiyabe National Forest in California and Nevada said, “Managers have the opportunity to interact with scientists and



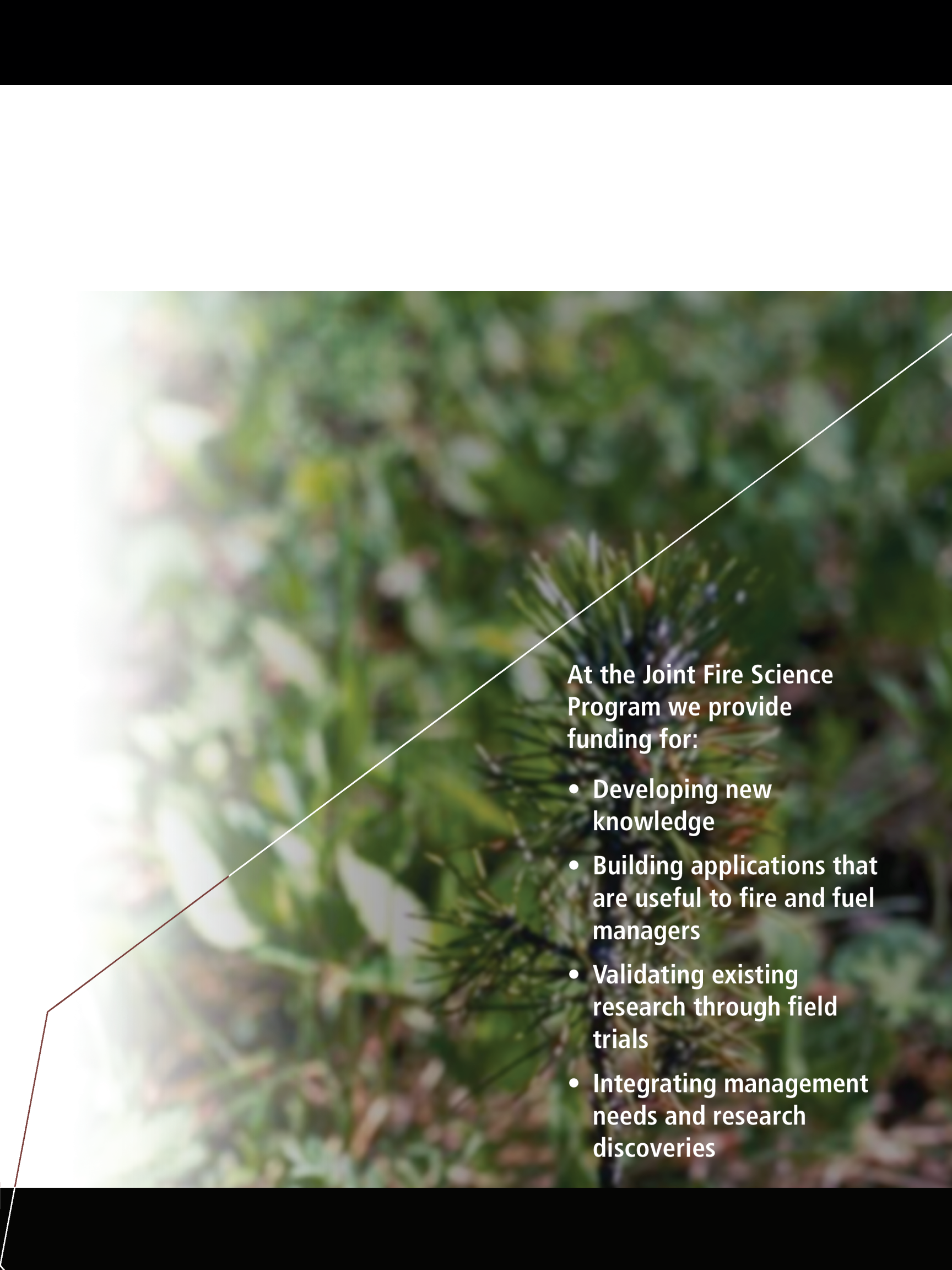
share their questions and issues, which helps develop better applied research and ensures a useful outcome.”

Erik Christiansen who is the past chair of the National Wildfire Coordinating Group’s Fuel Management Committee and current national fuels program coordinator for the Department of Interior’s Office of Wildland Fire states, “The regional consortia will help to ensure that local managers and practitioners are in close contact with researchers specializing in their local areas and that knowledge exchange has a better chance of occurring where it truly needs to: at the local level.”

Paul Langowski, vice-chair of the JFSP Governing Board stated it this way, “The initial efforts of the first eight consortia were so well received by both the management and science communities, the board decided to solicit proposals for additional consortia in 2010 rather than wait until a formal evaluation of the initial consortia.”

To learn more about the JFSP Knowledge Exchange Consortia, read the Fire Science Digest inserted into the pocket to the right, and tell your colleagues about this exciting learning opportunity. To learn more about the JFSP, please visit www.firescience.gov.





At the Joint Fire Science Program we provide funding for:

- Developing new knowledge
- Building applications that are useful to fire and fuel managers
- Validating existing research through field trials
- Integrating management needs and research discoveries

AN INTERAGENCY RESEARCH, DEVELOPMENT, AND APPLICATIONS PARTNERSHIP



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John Cissel, Program Manager

(208) 387-5349

National Interagency Fire Center

3833 S. Development Ave.

Boise, ID 83705-5354

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